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MICROECONOMETRIC ANALYSIS OF THE RETIREMENT DECISION: THE NETHERLANDS
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by
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ABSTRACT/RÉSUMÉ

It has been suggested that much of the dramatic decline in the participation rate of Dutch elderly has been caused by features of the Dutch retirement income support system. The Dutch system consists of several alternative schemes that can be used to retire early and these schemes are characterised by relatively weak eligibility conditions and generous replacement rates. This report assesses empirically the impact of the incentives embedded in these schemes on the retirement behaviour of older workers using micro data. The econometric model is estimated on a rich panel survey, specifically designed for ageing research. The results indicate strong incentive effects from Early Retirement schemes on the probability to retire. We also find that Disability Insurance replacement rates have a negative effect on the transition rate to Early Retirement. Early retirement replacement rates also affect the transition rates of the other exit routes. This indicates that income streams of alternative exit routes are taken into account in the decision to retire and that alternative exit routes act as substitutes, implying that changes in the regulations of one exit route have an effect on the exit rate of the others.

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Il a été suggéré que la baisse spectaculaire du taux de participation des personnes âgées aux Pays-Bas s'expliquait essentiellement par des particularités du système de retraites néerlandais. Celui-ci offre une gamme d'options alternatives qui pourraient être utilisées pour prendre une retraite anticipée et qui sont caractèrisées par des conditions d'éligibilité relativement faibles et des taux de remplacement généreux. Ce rapport évalue de manière empirique l'ampleur des effets incitatifs des institutions néerlandaises sur le comportement vis-à-vis de la retraite en utilisant un modèle micro-économique. Ce modèle est estimé à partir d'une enquête de panel étoffée, spécialement conçue pour la recherche sur le vieillissement. Les résultats indiquent que les systèmes de retraite anticipés ont de forts effets incitatifs sur la probabilité de prendre sa retraite. Nous constatons également que les taux de remplacement de la pension d'invalidité ont un effet négatif sur le taux de transition vers la retraite anticipée. Les taux de remplacement de la retraite anticipée ont aussi un impact sur les taux de transition d'autres voies de sortie. Ceci indique que les flux de revenus des voies de sortie alternatives sont pris en compte dans la décision de prendre sa retraite et que ces modes alternatifs agissent comme des substituts, ceci impliquant que des changements dans les réglementations d'une voie de sortie ont des conséquences sur le taux de sortie des autres.

TABLE OF CONTENTS

Tables

Appendices

MICROECONOMETRIC ANALYSIS OF THE RETIREMENT DECISION: THE NETHERLANDS

Maarten Lindeboom[1]

1. Introduction

1. This report describes and analyses retirement patterns in the Netherlands. Participation rates of the elderly have declined substantially over the past two decades in most OECD countries. This trend towards earlier retirement has been particularly pronounced in the Netherlands.

2. From a micro-economic viewpoint, retirement can be seen as a decision regarding the optimal age to stop working given the individuals environment and his/her relative preference for income and leisure. The individual environment is largely determined by the institutional setting. The Dutch system is characterised by the availability of a large number of 'exit routes'. Early retirement schemes are employer-provided programmes specifically designed to provide early retirement opportunities for elderly workers. Furthermore, though not designed for that purpose, in the past Unemployment Insurance and Disability Insurance schemes have been used specifically as retirement schemes (see for instance Aarts & de Jong (1990)).

3. The early retirement and social security programmes are characterised by relatively weak eligibility conditions and generous replacement rates inducing individuals to retire early. This may to a large extend have accounted for the substantive drop in labour force participation rates. There is however, little empirical research on the size of the incentive effects of Dutch institutions on retirement behaviour.

4. The core of this report is the specification of a competing risk duration model. Eligibility conditions of the exit routes and replacement rates are explicitly incorporated into the model. The model is estimated on the Dutch CERRA (Centre for Economic Research on Retirement and Ageing) panel survey, a survey specifically designed for research on ageing. Estimates of the model can be useful in assessing the relative importance of eligibility conditions and benefit replacement ratios in explaining retirement behaviour. Moreover, the model outcomes can be used as instruments in the evaluation of policy changes.

5. The results indicate strong incentive effects from Early Retirement schemes on the probability to retire. We also find that Disability Insurance replacement rates have a negative effect on the transition rate to Early Retirement schemes. Early retirement replacement rates also affect the transition rates of the other exit routes. This indicates that indeed income streams of alternative exit routes are taken into

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account in the decision to retire and that alternative exit routes act as substitutes, implying that changes in the regulations of one exit route have an effect on the exit rate of the others.

6. The next section (Section 2) gives a brief description of Dutch Social Security and Early Retirement schemes. The dataset used in the analysis is briefly discussed in Section 3. The empirical analysis is presented in Section 4. The analysis concerns a description of age and labour market status in 1993 and 1995, non-parametric Kaplan-Meier estimates of the hazard rate over the years 1988 to 1995 and estimation of a three-state competing risk model for individual retirement behaviour. Section 5 summarises and concludes.

2. A brief introduction to the Dutch system

7. Dutch benefit programmes can be divided into Social Security benefit programmes and employer provided Early Retirement programmes. Social Security programmes consists of Unemployment Insurance and Disability Insurance programmes. In turn Unemployment Insurance (UI) programmes can be divided into Unemployment Benefit (UB) programmes, to build a safety net to protect those who loose their income due to involuntary unemployment, and social assistance (SA) provisions.

8. The UB entitlement period depends on previous job tenure and work experience and are provided up to a maximum of 5 years. Benefit replacement rates are a fixed percentage of previous earnings and (roughly) 70 per cent of previous gross earnings. Benefit recipients have to be in active search for employment in order to maintain (full) benefits. This requirement does not hold for recipients of 57½ years and older. Effectively this means that for a substantial number of elderly workers (those with sufficient work experience) UB can be viewed as a pre-pension retirement income. After exhaustion of the UB entitlement period, the unemployed can apply for SA. The drop in unemployment benefit levels may be substantive as SA benefit are only 70 per cent of minimum wages (The gross minimum wage amounted in 1994 to 2163,- Dutch guilders per month). SA benefit is provided up to the mandatory retirement age (65 years).

9. Disability Insurance (DI) is provided to protect those who have a physical and/or mental inability to perform gainful employment. Up to the summer of 1993, benefit levels were 70 per cent of gross earnings and in practice were provided up to the mandatory retirement age. In the past DI schemes were specifically used as an exit route from the labour force. It was even common that employers offered elderly workers a bonus in addition to their social insurance income to make withdrawal from the labour force more attractive. In the summer of 1993, DI regulations were changed to reduce the number of beneficiaries. The reform included making benefit levels a function of the duration of DI receipt and medical examinations at regular intervals to verify that entitlement conditions still hold. From 1993, the length of the entitlement period for DI benefit at the rate of 70 per cent of gross earnings depends on age, and ranges from 0 to 6 years. After this initial period, benefits levels are lowered, the reduction depending on previous wages, minimum wages and age. (See Appendix II for details of the UI and DI benefit levels.) For the present project, it has to be noted that the change in DI regulations hardly affected the DI conditions for individuals aged over 45.

10. Early Retirement (ER) schemes, introduced in the late seventies, are employer provided schemes and were initially designed as programmes to induce older workers to retire early in order to make place for young unemployed workers. ER replacement rates vary by sector or even by firms within sectors, but are generally considered as financially attractive: net replacement rates may in some cases be close to 100 per cent. The average replacement rate is 80 per cent of previous gross earnings. ER eligibility conditions are typically dependent upon age and/or job tenure.

11. Since 1957 all residents of The Netherlands have been entitled to flat rate social security benefits at age 65. The monthly benefit amount, like the universally guaranteed income program for younger persons, is tied to the government mandated minimum wage.

12. Almost all workers can supplement these basic social security benefits with mandatory employer pension benefits. Meuwissen (1993) estimates that 80 per cent of households with a head aged 65 and over received some form of supplementary occupational pension in 1989. Kapteyn and DeVos (1997) report that almost all occupational pensions are defined benefit plans (usually basing benefits on some share of final year's earnings) and that, together with social security benefits, they replace between 60 and 69 per cent of the median retiree's pre-tax earnings.

13. Outflow rates from the stock of non-working individuals to work appear to be extremely low for the Dutch elderly. As far as elderly UI an DI recipients are concerned, active search for (re)employment is not required in order to maintain eligible for benefits, and ER recipients actually loose retirement benefits upon re-entering employment. Therefore the results of the competing risk model to be presented below will turn out to be important in understanding low participation rates. The model will moreover identify policy instruments to reduce early withdrawal from the labour force.

3. Data

14. Data are obtained from the first two waves of the CERRA panel survey. The CERRA panel survey is a Dutch survey that is designed specifically for the analysis of health and retirement issues, and resembles the well known Health and Retirement Survey (HRS) of the Michigan Survey Centre. The first wave dates from the fall of 1993 and consists of 4727 households in which the head of the household was between 43 and 63 years of age at the date of the interview. In each household both the head and partner, if available, were interviewed. Extensive information was obtained on labour market status, sources of income, labour market history, housing, health and a variety of socio-economic variables.

15. In the fall of 1995 the same respondents were contacted for a second interview. Approximately 74 per cent of the first wave respondents participated in the second wave, which resulted in about 3500 households. The second wave primarily focused on the changes in labour market status, income, health status and other socio-economic variables that might have occurred in the two year interval.

16. Internal evaluations of item non-response and representativeness of the first wave of data show them to be of high quality. In general, item non-response was not a problem. Non-response was, however, relatively high for the income questions, with a non-response rate of up to 30 per cent for some income sources. CERRA data was compared to data from The Netherlands Central Bureau of Statistics. These data were comparable based on age, sex, labour status, and education.

4. Empirical analysis

4.1 The distribution across states at a point in time and Kaplan-Meier estimates of the hazard rate out of employment.

17. The non-parametric Kaplan-Meier estimates of the hazard rate out of employment of this section are based on retrospective information over the period 1988 to 1993 of the 1993 wave. In addition we used information on labour force dynamics over the period 1993-1995 from the 1995 wave. We included all respondents aged 50 and above, as a significant part of the retirement from the labour force in the

Netherlands takes place at ages close to 50. More specifically, participation rates in 1990 of Dutch males of 50 years and older was about 60 per cent. For females the corresponding figure was about 20 per cent.

18. The exit states that we will consider in our analysis are: Disability Insurance (DI), Unemployment Insurance (UI) and Early Retirement (ER). The UI category includes all non-working states other than DI and ER, such as out of the labour force, retirement because of mandatory retirement and Unemployment Insurance. A distinction of the separate modes of retirement within UI is not feasible given the data at hand.

19. Table Ia and Ib present cross-tabulations of age and labour market status in our sample in 1993 and 1995. From these tables it can be seen that participation rates start to decline at even very young ages. At these younger ages Disability Insurance (DI) recipients account for the larger part of the non-participation. The fraction of individuals in UI and DI seems to increase with age, which mainly reflects the absorbing nature of retirement in the Netherlands. At ages of 60 and above Early Retirement becomes the dominant mode for retirement.

20. The tables presented above provide a picture of retirement at a point in time, which is the result of inflow in the states and average duration in the states. As in practice retirement states are absorbing in The Netherlands, it becomes particularly relevant to analysis inflow into non-participation. Table IIa provides Kaplan-Meier estimates of the transition rate of work to the non-work states ER, DI and UI. The table reports these transition rates for different age categories over the period 1988 to 1994. It has to be noted that transition rates for ages 58-61 for the years 1988-1990 are based on a small number of observations. This is due to the sample of the CERRA retirement survey (recall that the first wave includes only respondents aged between 53-63 in 1993). The same "data problems" obstructed us to present Kaplan-Meier estimates for earlier years (i.e. years preceding 1988). Furthermore, self employed are excluded from the analysis. Only 7 per cent of the original sample consists of self employed. This would be a too small sample to obtain reliable estimates.

21. From the table it can be seen that at early ages retirement is predominantly through DI and or UI. ER transitions become large and dominant at more advanced ages, though this is well before age 60. Note that UI and DI transition rates are slightly increasing over the ages, whereas ER transition rates increase markedly at age 58. Eligibility for most ER schemes is based on a function of age and tenure. Apparently an increasing number of individuals meet the ER eligibility conditions at ages beyond 58. There does not seem to be much variation in the transition rates over the period 1988-1994. Finally, the results of Table IIa are in line with the results of the cross-sectional information of Tables Ia and Ib: participation rates of workers above age 60 are extremely low. In Table IIb, we present Kaplan-Meier estimates of the hazard rate for males. The number of females in the sample did not allow for a separate analysis of female transition rates by age and year. Therefore conclusions about female transition rates should be obtained from a comparison of Table II (males and females) with IIb (males only). Table IIb is quite similar to Table IIa, so that gender effects seem to be absent. It has to be noted however, that only heads of households are included and that female heads of household may not be typical for the female population[2].

22. The tables above provide information on average transition rates out of work. They do not provide us with information how these transition rates vary with different characteristics of the sample. They, moreover, do not tell us why people retire and to what extend eligibility conditions and benefit replacement rates determine the propensity to retire early. The analysis of the next subsection deal with this.

2. The head is defined as the main income earner in the family. Recall that female participation rates are extremely low and that the typical picture in the Netherlands is that the man is the main income provider.

4.2 Maximum Likelihood estimates of a competing risk model for transitions out of employment

23. The maximum likelihood estimates of the competing risk model are based on a smaller sample than used above. We restrict ourselves to respondents working in the fall of 1991. The survey information enables to accurately measure an individual's employment history up to that point and subsequent labour force participation behaviour up to 1995. We use the period 1991-1995 for estimation as relatively reliable information on relevant regressors could be obtained for this time period This concerns mainly time varying regressors such as sector of employment, marital status, health condition, and, perhaps most importantly, ER eligibility conditions. This would be more problematic for a larger sample obtained from retrospective information.

24. We restrict ourselves to workers at a point in time (1991) to avoid sample selection problems that are typical for stock sampled duration data. More specifically, the duration distribution of previous employment durations of non-working respondents in 1991 may be tedious to derive and estimate. Expressions for stock sampled durations of a duration variable of interest can be obtained from, for instance, Ridder (1984) and Lancaster (1990). We use a likelihood based on the distribution of durations beyond the selection date (1991), conditional on the elapsed duration (i.e. the duration elapsed up to the selection date). The expressions are tractable and the likelihood remains relatively easy to estimate.

25. Retirement behaviour of self-employed is expected to differ substantially from that of other workers. We only observe a few self-employed, so that these are excluded from the analysis.

26. The model acknowledges that some variables may not be constant over time; age, income and ER eligibility indicators and benefit replacement rates being the most prominent ones. The model explicitly acknowledges eligibility rules for the alternative exit routes and the time varying nature of life cycle income. With respect to the latter, Burkhauser (1978) was the first to argue that not only current income but also future income streams are important for the retirement decision. In making individual retirement decisions the present discounted value of income streams for alternative work and retirement options should be compared. In accordance with the (modern) retirement literature we follow this approach. So, we acknowledge that at different points in time different options are compared and that this may govern the retirement decision. This means that for this “option value” approach at income profiles over an individual's remaining life cycle need to be generated at different points in time.

27. As far as wage income is concerned, we rely on analysis of Heyma (forthcoming). He estimates a simultaneous model for wage and labour force participation on panel information of the CERRA data over the years 1991 to 1995. The panel structure of the sample is used explicitly. From the model estimates of (remaining) life cycle income profiles can be derived for each respondents at different points in time. These are used in the analysis. Details of this model are provided in Appendix I.

28. Income streams for alternative retirement options are derived using ER eligibility rules and social security rules. ER eligibility conditions are typically a function of age and/or tenure. ER replacement rate are a fixed percentage of previous gross earnings. Replacement rates and eligibility conditions may differ by sector and even firms, they are negotiated over yearly by employer and employee organisations and may therefore vary over time. We observe the replacement rates in our sample. Using gross replacement rates and a simplified version of our tax system we constructed net replacement rates. The average net replacement rate in 1991 was 83 per cent.

29. Furthermore DI/UI entitlement period depend upon age/tenure and benefit levels change after an initial entitlement period. Specifics about DI and UI benefit replacement rates are documented in Appendix II.

30. We assume in the analysis that DI and UI retirement routes, in contrast to ER schemes, are always accessible to the individual. For non-eligible workers the transition rate from work to ER is set to zero. More specifically the hazard rate out of work can be written as:

$$\theta(t;X_t, Z, \beta) = \theta_{DI}(t;Xt, Z, \beta_{DI}) + \theta_{UI}(t;Xt, Z, \beta_{UI}) + I^{ER}(t)\,\theta_{ER}(t;Xt, Z, \beta_{ER})$$

$I^{ER}(t)$ is an indicator function that takes on the value 1 if an individual is eligible for ER at time t and zero otherwise. X_t and Z are vectors of time varying and time constant regressors, respectively. The parameter vectors associated with each of the exit rates are denoted by β_k, $k \in \{ER,DI,UI\}$.

31. Other time varying covariates that are used in the analysis are calendar time effects and a variable denoted as a "time-to-Early Retirement" variable. The calendar time effect may reflect business-cycle effects. The "time-to-Early Retirement" variable is the time that individuals, who are not eligible for an ER scheme, have to wait before they become eligible for ER benefits. Individual retirement decisions are governed by income/leisure considerations and it may be conceivable that individuals choose a financially less attractive option such as DI or UI, if eligibility for ER is at a remote date. This variable will only be relevant for the hazard rate from work to DI and UI.

32. As a consequence of the model formulation discussed above, the model captures the effect of social security by using variations in benefits replacement rates and eligibility across individuals as well as variations for an individual over time. In addition, the model is estimated on a sample over the period 1991-1995. So any behavioural effect of institutional changes in DI that may have occurred in 1993 is accounted for, either by the calendar time effects or by the social security incentives effect.

33. Wealth is not included into the model. In the construction of the database it proved to be difficult to obtain accurate results (there is a high non-response rate). Moreover, less than 20 per cent of the respondents in the total sample (i.e. the 4700 initially selected heads of households) indicated to have financial assets. This is in line with other Dutch results. It has been argued that there is little incentives to hold financial assets due to the availability and the generosity of social security and pension system in the Netherlands.

34. Duration is measured in months in the job that the individual held in October 1991. Age-specific exit rates can be derived by taking the time varying age variable into account. We return to the effect of ageing below. The competing risk model allows for duration dependence. We take a step function of duration with a single shift at 5 years. More complex step-functions did not improve the estimation results[3].

35. Table A1 of Appendix III gives sample means of some explanatory variables that are used in the analysis. The maximum likelihood results of the competing risk model are presented in Table III. The first column presents estimates of the transition rate from work to early retirement, the second column of the transition rate from work to Disability Insurance, the third column of the transition rate from work to Unemployment Insurance and other non-work states. Positive coefficients are associated with high transition rates, negative coefficient with low transition rates.

3. Moreover, as calendar time, age , eligibility and "time-to-ER" are time varying regressors, a more refined duration dependence patterns might be obstructed by identification problems. With respect to this, the ER eligibility indicator may become particularly relevant as in a large number of retirement schemes elapsed duration is an important determinant of ER eligibility.

36. The results for the first column indicate that only a limited set of variables seem to have a significant impact on the ER transition rates. These are the number of times out of the labour market, age, the DI replacement rate and calendar time effects for the years 1993-1995. The number of times that an individual was out of the labour market could be seen as a proxy for the relative preference for leisure. In this way a positive coefficient would indicate that individuals with a high preference for leisure would retire relatively early. The age effect indicates that the propensity to retire increases with age. For instance, for a 50 year-old male the hazard equals about 0.34 (exp{-6.07 +0.10*50}. The hazard rate of this male increases with about 10.5 per cent per year due to ageing (this is from exp{0.10}=1.105). The duration patterns seem to imply that the transition rate to ER has increased after the changes in the DI regulation of 1993. The hazard increases structurally, which should be contrasted with the calendar time effect of the transition rate to DI. Indeed, this hazard rate seems to have decreased in 1993, though it has to be noted that the coefficient is not significant at the 5 per cent level.

37. The DI replacement rate has a significant negative effect on the transition rate from work to Early Retirement. This seems to imply that income streams of alternative exit routes are indeed taken into account on the decision to retire through ER. There is no significant effect of the UI replacement rate. From this it may be concluded that DI and ER schemes act as substitutes and that changes in the regulations of one exit route have an effect on the exit rate of the other.

38. The ER replacement rate appears to have no effect. This is a bit puzzling. ER replacement rates are very generous and from the data it can be seen that 583 out of the 2560 respondents retire through an ER scheme in a 4 year time period. This number is much larger than those for DI and UI. Furthermore, a closer inspection of the total sample of ER recipients revealed that about 80 per cent retired directly through ER at the moment that they became eligible for an ER scheme and that the remaining 20 per cent retired within 1.5 years. This would surely indicate that ER is a relative attractive option as a retirement mode. It is conceivable, that the larger part of the income effect of the ER replacement rate is absorbed by the eligibility indicator. For non-eligible workers the transition rate is set to zero. A way to test for this is to ignore the eligibility indicator and to let the effect of eligibility and income be represented by the ER replacement rate (which is zero for non-eligible workers). Excerpts from the results are reported in Table IV. The results are strikingly different from the results of Table III. The ER benefit replacement rate in Table IV has an extremely large effect and it appears that indeed ER schemes provide strong incentives to retire early. This strong effect was previously absorbed by the eligibility indicator. Ignoring the ER eligibility indicator also has a large effect on the DI benefit replacement rate and age. The likelihood worsens with 89 points. A standard likelihood ratio test would strongly reject the restriction that eligibility indicators play no role[4]. From the results of Table III and Table IV it can be concluded that conditions of the ER scheme play a very important role in the decision to retire early. To state it differently the results of Table IV illustrate that an ER benefit is apparently “an offer you can't refuse”.

39. The results of the second column of Table III indicate that indeed bad health is a major determinant of the decision to retire through DI. It has to be noted, however, that the health measure used is a subjective indicator and that we included the health level of 1993 as an explanatory variable. This may blur the picture. There is considerable literature on the effect of self-assessed health measures in retirement models [see for example Bound (1991) and Kerkhofs and Lindeboom (1995)]. We furthermore find strong effects of work experience and some effects of the ER replacement rate. With respect to the latter, higher ER benefit replacement rates lower the transition rate to DI. Note, however, that this

4. Strictly speaking, the eligibility indicator could be seen as a time varying variable with coefficient 1. To be more specific, if the hazard rate $\theta=\exp\{x'\beta\}$, then the eligibility indicator could be absorbed into the hazard rate by specifying $I * \theta=\exp\{ \log(I) + x'\beta\}$. Ignoring the eligibility indicator is effectively the same as leaving the variable log(I) from the specification.

variable is not significant at the standard levels. This may be due to the relatively small number of observed transitions into DI. DI replacement rates do not have significant effects on the transition into DI.

40. The UI transition regression results signal significant effects of health, industry, times out of the labour force, house owners and ER replacement rates. With respect to the income variables, the ER variable indicates that high ER benefit replacement rates induce people not to retire through UI. The effect of the DI replacement rate is a bit surprising. The coefficient suggests higher UI hazard rates for individuals with high DI replacement rates. Moreover, the UI replacement rate has the wrong sign. It may be that it proves to be difficult to separate the effects of UI and DI replacement rates. We refer to Appendix II for details on the UI and DI replacement rates.

41. Duration dependence only plays a role for the transition rate from work to UI. This is in line with earlier results from a simplified duration model where time varying covariates are excluded.

4.3 Simulations with the model

42. In Tables V and VI we report results of simulations with the model. The simulations are based on 10000 randomly generated participation profiles, using the parameters of the duration distribution reported in Table III.

43. The basecase is reported in Table V (i.e. we use the characteristics of the sample). Note that this distribution is close to the cross-section distribution of age and state for 1993, as reported in Table Ia. Next we simulated a situation in which eligibility for ER is postponed with 2 years. The results of this simulation are reported in Table VI. The table basically shows that there is quite a large effect on retirement through ER. Participation rates rise, but also a part of the retirement finds it way through the alternative retirement routes (UI and DI). The relative value of DI and UI change as ER becomes accessible at a later date. This induces individuals to retire through the alternative exit routes (UI and DI), which shows that UI and DI act as substitutes for ER schemes. This, consequently demonstrates that policies that restrict ER opportunities need to be combined with restrictions on the alternative exit routes.

44. We also performed some extra simulations in which the replacement rates are reduced (results not shown). These simulations appeared to generate little effects. As argued in the Section 4.2 there are not much effects from the replacement rates and the larger part of the incentives effects seems to be absorbed by the eligibility conditions. Most people retire immediately once they become eligible for an ER scheme and variations in the ER replacement rates do not add much to this. This may be largely due to the extremely generous replacement rates of most ER schemes. Replacement rates of UI and DI (calculated according the description in the paper) are on average 0.47 and 0.66, respectively. This contrasts largely with the average replacement rate of 0.83 for ER schemes.

5. Summary and conclusions

45. Participation rates of the Dutch elderly have declined dramatically over the past decades. This decline has been more drastic than in most other OECD countries. The Dutch retirement income support schemes provide a range of alternative options that could be used to retire early. Moreover, early retirement and social security programmes are characterised by relatively weak eligibility conditions and generous replacement rates and it has been argued that this to a large extent may have accounted for the substantive drop in labour force participation rates of older workers. There is however, little empirical research on the size of the incentive effects of Dutch institutions on Dutch retirement behaviour. The present study aimed at shedding some more light on this issue.

46. To this end, we specified and estimated a competing risk duration model that explicitly took eligibility conditions of the exit routes and replacement rates into account. The model was estimated on data from the Dutch CERRA (Centre for Economic Research on Retirement and Ageing) panel survey, a survey specifically designed for ageing research.

47. The results indicate that early retirement schemes create strong incentives to early withdrawal from the labour market. We also found that Disability Insurance replacement rates have a negative effect on the transition rate to Early Retirement. Early retirement replacement rates also affect the transition rates of the other exit routes. This indicates that income streams of alternative exit routes are indeed taken into account in deciding when to retire and that alternative exit routes act as substitutes, implying that changes in the regulations of one exit route have an effect on the exit rate of the others.

BIBLIOGRAPHY

Aarts, L.J.M. & Ph. R. de Jong (1992), *Economic Aspects of Disability Behaviour*, North Holland, Amsterdam.

Bound, J. (1992) "Self reported versus objective measures of health in retirement models", *Journal of Human Resources*, 26, 107-137.

Heyma, A.O.H. (forthcoming) "Dynamic Models of Retirement from the Labour Force: An empirical analysis of early Exit in the Netherlands", PhD thesis, Leiden University.

Kapteyn, A. & de Vos K. (1997) "Social Security and Retirement in the Netherlands", paper for the NBER Project on International Social Security Comparisons.

Kerkhof, M.J.M. & Lindeboom, M (1995) "Subjective Health measures and State Dependent Reporting Errors", *Health Economics*, 4, 221-235.

Meuwissen , P.J.J. (1993), "AOW ontvangers an aanvullend (pensioen)inkomen", *Statistisch Magazine*,11-13.

Table Ia: **Cross tabulation of Age and labour market status in 1993**

(per cent of total for each age)

Age 1993	Employees	UI Beneficiaries	DI Beneficiaries	ER Beneficiaries	Self Emp.
43	85.4	1.9	7.8		4.9
44	80.8	4.2	5.8		9.2
45	84.9	5.0	4.2		5.9
46	83.1	6.9	3.1		6.9
47	84.1	3.7	6.7		5.5
48	78.7	4.5	11.2		5.6
49	75.7	9.9	5.4		9.0
50	67.9	9.2	6.4		16.5
51	76.0	5.0	11.0		8.0
52	69.7	9.2	11.8	1.3	7.9
53	68.6	8.2	10.9	0.7	11.6
54	62.2	13.2	15.9	0.9	7.8
55	59.8	13.7	15.5	2.1	8.9
56	53.2	16.0	18.8	6.2	5.8
57	47.8	13.6	17.9	13.3	7.4
58	36.4	18.2	20.6	17.6	7.2
59	36.5	15.6	20.2	23.8	3.9
60	16.7	20.2	26.5	31.7	4.9
61	13.6	18.8	20.4	42.3	4.9
62	7.0	23.5	22.2	44.7	2.6
63	5.8	23.5	21.6	45.1	4.0
64	6.3	29.2	14.6	45.8	4.2
65	25.0	75.0			

Source: The CERRA database

Table Ib**: Cross tabulation of age and labour market status in 1995.**

(per cent of total for each age)

Age 1995	Employees	UI beneficiaires	DI beneficiaires	ER beneficiaires	Self Emp.
45	81.7	3.7	7.3		7.3
46	79.1	4.7	4.7		11.6
47	82.4	5.5	4.4	1.1	6.6
48	79.8	11.5	1.9		6.7
49	82.4	5.3	6.1		6.1
50	79.0	6.5	9.7		4.8
51	72.3	9.6	7.2		10.8
52	68.7	10.8	7.2		13.3
53	70.3	6.8	16.2		6.8
54	63.2	14.0	21.1		1.8
55	60.0	11.4	14.3	5.2	9.0
56	55.1	12.1	17.4	5.7	9.7
57	50.6	19.5	14.1	8.7	7.1
58	33.6	19.2	18.8	21.0	7.4
59	35.5	14.1	16.7	26.1	7.7
60	19.8	19.0	20.2	34.9	6.2
61	11.6	15.3	22.2	45.8	5.1
62	3.2	20.8	26.0	46.4	3.6
63	8.0	22.7	18.2	47.1	4.0
64	5.0	21.7	21.7	48.9	2.7
65	2.1	82.4	3.3	10.0	2.1
66		91.2		8.8	
67	33.3	66.7			

Source: The CERRA database.

Table IIa: **Kaplan - Meier estimates (males and females) of hazard out of work to UI, DI, ER**

(per cent)

	1988			1989			1990			1991			1992			1993			1994		
age	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER
50	1.8	1.8	0	0.9	1.3	0	0.9	1.4	0		1.9		0	1.3	0	0	0	0	4.8	0	0
51	1.3	4.4	0.4	0.9	1.3	0	1.4	2.7	0	0.5	1.9	0.5	0	0	0	3.7	5.6	0	3.3	1.7	0
52	0.5	1.9	0.5	0.9	1.8	0.9	2.3	3.2	0.5	2.8	1.4	0.5	1.5	1.0	0.5	0	2.5	0	2.0	0	0
53	1.4	1.9	0.5	0.9	1.9	0.9	0.5	1.0	0.5	1.4	1.4	0.5	1.9	1.0	1.0	2.8	0	1.4	2.6	2.6	0
54	1.4	4.7	2.4	0.5	2.4	3.4	1.9	1.4	4.8	2.9	2.4	3.4	2.9	0.5	2.4	1.3	0	4.0	1.4	2.1	6.4
55	1.1	2.7	2.7	1.5	1.5	2.5	5.2	2.1	3.1	5.2	2.1	5.7	4.8	2.1	4.8	3.4	0	4.1	1.4	2.1	2.8
56	1.6	1.0	11.5	2.3	3.4	2.3	1.0	1.6	5.8	2.9	4.0	8.0	1.2	1.2	9.9	4.9	2.4	8.9	3.7	0.7	6.7
57	3.8	2.5	7.6	2.4	2.4	7.8	1.2	2.5	13.0	2.3	2.8	6.8	1.3	0.7	19.5	1.8	0.9	15.8	4.7	0	19.8
58	2.4	2.4	12.7	1.5	3.7	19.3	0.7	0.7	17.0	0.7	0.7	20.1	1.9	1.9	23.9	3.0	1.0	16.0	0	3.2	10.6
59	0	4.8	23.8	9.6	1.5	38.0	2.0	3.9	43.1	4.2	1.7	35.8	3.8	0	42.9	1.2	2.5	38.3	1.2	0	39.0
60				6.3	6.3	31.3	5.1	3.8	43.2	7.3	1.9	31.5	4.2	0	35.2	2.3	7.0	48.8	4.2	4.2	39.6
61									44.4	2.2	2.2	44.4	3.1	0	34.4	8.6	0	22.9	0	5.3	52.6

Source: Based on the CERRA database

Table IIb: **Kaplan - Meier estimates for males of the hazard out of work to UI, DI, ER**

(per cent)

	1988			1989			1990			1991			1992			1993			1994		
age	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER	UI	DI	ER
50	1.5	2.0	0	1.0	1.0	0	0	0	0	0	0	0	0	1.5	0	0	0	0	3.7	0	0
51	1.5	4.0	0.5	1.0	1.5	0	1.5	3.1	0	0	2.2	0.6	0	0	0	4.3	4.4	0	3.7	0	0
52	0	1.0	0.5	0.5	2.1	1.0	2.0	3.5	0.5	2.6	0.5	0.5	1.7	1.1	0.6	0	2.6	0	2.3	0	0
53	1.0	1.5	0.5	0	1.1	0.5	0	1.1	0.5	1.6	1.6	0.5	2.2	1.1	1.1	2.4	0	1.6	2.6	2.6	0
54	1.0	4.0	2.5	0.5	2.6	3.6	2.1	1.0	4.6	2.7	2.7	3.8	3.2	0.5	2.1	0.8	4.7	0.8	0.8	1.7	7.6
55	1.2	2.5	3.1	1.1	1.6	2.7	5.0	1.7	3.3	5.0	1.7	6.1	5.4	2.4	5.4	3.9	0	3.9	1.6	0.8	3.3
56	1.1	1.1	10.3	1.3	3.9	2.6	1.1	1.6	6.0	3.1	3.7	8.6	1.3	1.3	9.4	4.8	2.9	10.6	3.4	0.8	7.6
57	3.5	2.8	8.5	2.6	2.0	8.5	1.4	2.8	15.4	1.8	3.0	7.2	1.5	0.7	20.4	1.9	1.0	17.1	5.7	0	22.7
58	2.8	2.1	12.4	1.7	3.3	20.7	0	0.7	17.9	0.9	0	23.1	2.1	2.1	25.3	3.4	1.1	18.4	1.2	3.5	11.8
59	0	0	22.4	4.1	1.7	39.7	1.1	2.2	43.3	2.8	1.8	37.6	3.4	0	44.9	1.4	2.7	37.8	1.4	0	41.4
60					6.7	33.3	4.5	3.0	31.3	6.0	2.0	34.0	1.6	0	39.1	3.0	3.0	54.5	4.4	4.5	38.6
61									44.4	2.4	2.4	43.9	3.4	0	34.5	3.2	0	25.8	0	7.1	50.0

Source: Based on the CERRA database

Table III. **Maximum likelihood estimates of a competing risk model for the transition out of work. States: Early retirement (ER), Disability Insurance (DI) scheme and Unemployment Insurance and other states.**

	ER		DI		UI	
(i) Time constant covariates						
Constant	-6.07	(1.6)	-12.3	(2.9)	-10.2	(4.9)
Female	-0.32	(1.2)	-0.60	(1.2)	0.07	(0.2)
Married	0.11	(0.6)	-0.48	(1.1)	-0.25	(0.9)
Educational level (-1.7)	0.05	(1.8)	-0.05	(0.8)	0.03	(0.6)
White collar worker	-0.13	(1.3)	0.04	(0.1)	0.02	(0.1)
Bad health (1)	0.09	(0.8)	3.05	(12.0)	0.62	(2.5)
Industry	0.2	(1.8)	-0.29	(0.8)	0.66	(3.4)
Construction	-0.06	(0.3)	0.56	(1.5)	-0.32	(0.2)
Banking	0.14	(0.8)	0.62	(1.6)	0.06	(0.2)
# Times employed	-0.05	(1.5)	0.04	(0.5)	-0.05	(0.8)
# Times employed	0	(0.1)	-0.01	(0.8)	0.01	(1.1)
# Times of the Lab.F.	0.51	(6.3)	0.02	(1.6)	-0.62	(2.7)
Work experience	-0.04	(0.5)	-0.5	(5.0)	-0.09	(0.8)
House owner	-0.14	(1.4)	0.09	(0.3)	-0.61	(3.5)
Partner works	-0.12	(1.1)	0	(0.0)	-0.27	(1.3)
# Dependents in the household	0.05	(0.8)	0.03	(0.2)	0.02	(0.2)
Part-time (<21 hours a week)	-0.34	(1.4)	-0.21	(0.4)	-0.15	(0.5)
(ii) Time varying covariates						
Age in years	0.1	(2.7)	0.13	(3.1)	0.13	(4.5)
Log of net yearly income (3)	-0.05	(0.3)	-0.04	(0.2)	-0.12	(1.5)
Replacement rate ER (4)	0.13	(0.2)	-1.11	(1.5)	-0.96	(2.1)
Replacement rate DI (5)	-1.93	(4.2)	-1.51	(1.3)	0.68	(1.9)
Replacement rate UI (6)	0.25	(0.4)	0.91	(0.9)	-0.46	(1.2)
Time to early Retirement (2)	-	-	0.00	(0.1)	0.01	(1.1)
(iii) Calendar time effects						
1992/1993	-0.1	(0.9)	-0.22	(0.8)	0.38	(1.8)
1993/1994	0.47	(3.2)	-0.67	(1.7)	0.11	(0.4)
1994/1995	0.54	(3.5)	0.05	(0.1)	0.19	(0.7)
(iv) Duration dependance						
>5 years	-0.35	(1.1)	0.52	(1.1)	-1.09	(5.0)
=-Log Likelihood		17962.2		506.9		1088.2
# Transitions		583		77		158
# Observations		2560		2560		2560

Note : t-statistics in parentheses

(1) Bad health is derived from the question "would your health limit you in your work". The dummy variables equals 1 if health problems are present.

(2) Measured in years. The variables equals zero in case an individual is eligible for ER benefits.

(3) In 1993 prices.

(4) Replacement rate in fractions of net wage earnings.

(5) DI benefit levels are 70% of previous earnings for a DI eligibility period. The DI eligibility period depends on age and varies from 0 to 6 years. After this period benefit levels are 70% of minimum wages plus (1.4* (age-15)) % of the difference between previous gross earnings and the minimum wage. The replacement rate is derived as the ratio of the total amount of DI benefits that an individual would obtain if he/she would remain in DI up to age 65 (mandatory retirement age) and the wage earnings from age at 1991 up to age 65.

(6) The unemployment insurance benefit levels are 70% of previous gross earnings for a period of 6 months. A benefit extension period can be obtained that depends upon the individuals work history. The benefit extension period ranges from 0 to 60 months. After exhaustion of UI eligibility, benefit levels drop to 70% of the minimum wage. The replacement rate is derived as the ratio of the total amount of DI benefits that an individual would obtain if he/she would remain in DI up to age 65 (mandatory retirement age) and the wage earnings from age at 1991 up to age 65.

Table IV **Excerpts from a competing risk model where ER eligibility rules are ignored**.

variable		
Age in years	0.15	(4.8)
Replacement rate ER	6.50	(22.8)
Replacement rate DI	-2.36	(4.9)
Replacement rate UI	0.35	(0.7)
-Log likelihood		1875

Table V **Simulations with the model: the base case. Work, ER, DI and UI participation rates(1)**

Age	Work	ER	DI	UI
51.000	0.750	0.001	0.121	0.127
52.000	0.731	0.003	0.129	0.137
53.000	0.709	0.004	0.139	0.148
54.000	0.689	0.006	0.147	0.158
55.000	0.653	0.016	0.158	0.174
56.000	0.621	0.023	0.166	0.190
57.000	0.577	0.046	0.174	0.202
58.000	0.514	0.084	0.186	0.216
59.000	0.441	0.136	0.192	0.231
60.000	0.333	0.226	0.198	0.244
61.000	0.228	0.315	0.204	0.254
62.000	0.155	0.376	0.207	0.262
63.000	0.113	0.408	0.211	0.268
64.000	0.093	0.420	0.215	0.272

(1) 1000 individual eligibility profiles for ER were generated using the age-eligibility distribution in the sample. Next, we calculated retirement probabilities for each of the 10000 drawings over the life cycle (these probabilities were generated using the parameters from the duration distribution in Table III). For each individual we subsequently compared the probability of retirement at a specific age with a (new) drawing from a Uniform (0,1) distribution to decide whether the individual retired. More specifically, we took the individual as retired at a specific age (a 1/0 decision) if the retirement probability exceded the random drawing. We moreover assumed that retirement was an absorbing state (i.e. once retired, individuals did not return to work).

Table VI **Simulations with the model: eligibility conditions for ER restricted. New eligibility age = old eligibility age + 2 years. ER, DI and UI participation rates**

Age	Work	ER	DI	UI
51.000	0.746	0.000	0.121	0.133
52.000	0.728	0.001	0.129	0.141
53.000	0.706	0.002	0.139	0.153
54.000	0.684	0.003	0.148	0.164
55.000	0.659	0.005	0.158	0.179
56.000	0.631	0.007	0.166	0.195
57.000	0.595	0.019	0.176	0.209
58.000	0.564	0.026	0.186	0.223
59.000	0.515	0.050	0.195	0.240
60.000	0.451	0.087	0.205	0.257
61.000	0.375	0.139	0.213	0.273
62.000	0.266	0.228	0.220	0.286
63.000	0.177	0.303	0.223	0.297
64.000	0.122	0.348	0.227	0.303

(1) 1000 individual eligibility profiles for ER were generated using the age-distribution in the sample. Next, ER eligibility was postponed by 2 years We subsequently generated new participation profiles for each of the 10000 drawings (see Table V for a more detailed description).

Appendix I

Specification of the wage-participation model

The wage participation model is based on information about income and work status in 1991, 1993 and 1995. The following model is specified:

$$w_{it} = X_{it}\beta + \alpha_i + \varepsilon_{1it}$$

$$I^*_{it} = Z_{it\gamma}\delta + \gamma_i + \varepsilon_{2it}$$

Where X and Z are vectors including both time varying and time constant covariates. α and γ are unobserved individual effect and ε_1 and ε_2 are transitory shocks. The model is essentially a Roy model where wages w are only observed if a latent construct I^*_{it} exceeds a certain threshold. The latent construct is unobserved but instead we observe whether individuals are at work at time t, I_{it}=1. It is assumed that I_{it}=1 iff I^*_{it} >0 and that I_{it}=0 otherwise. The wage equation and participation equation are correlated because both the unobserved time constant effects (α and γ) and the transitory shocks (ε_1 and ε_2) are allowed to be correlated. It is assumed that the individual effects are uncorrelated with the transitory shocks. More specifically,

$$\text{Cov}(\varepsilon_1, \varepsilon_2) = \rho_e$$
$$\text{Cov}(\alpha, \gamma) = \rho$$
$$\text{Cov}(\alpha, \varepsilon_k) = 0 \qquad k=1,2$$
$$\text{Cov}(\gamma, \varepsilon_k) = 0 \qquad k=1,2$$

Heyma takes a random effects approach to simultaneously estimate the wage-participation model. As a consequence the model allows for self-selectivity effects that may underlie the observed income and labour market status combinations. The model incorporates time-varying variables like business cycle effects, age effects and tenure effects. This enables us to construct age-income profiles for different respondents.

Appendix II

Replacement rates in disability and unemployment insurance schemes

DI benefit levels are 70% of previous earnings for a DI eligibility period. The DI eligibility period depends on age and varies from 0 to 6 years. After this period benefit levels are 70% of minimum wages plus (1.4*(age-15)) % of the difference between previous gross earnings and the minimum wage. The replacement rate is derived as the ratio of the total amount of DI benefits that an individual would obtain if he/she would remain in DI up to age 65 (mandatory retirement age) and the wage earnings from age at 1991 up to age 65. More specifically,

$$\text{DI rate} = \frac{0.7 * w_t * \text{DI entitlement period} + \text{DI Supplement}}{\text{Sum of } w_t \text{ to time at which the individual becomes 65}}$$

$$\text{DI supplement} = 0.7*\text{minwage} + 0.014*(\text{age}_t - 15)*(w_t - \text{minwage})*(65 - \text{age}_t - \text{DI entitlement period})$$

Of course the supplement is only provided in case the individual has not reached the age of 65 (the mandatory retirement age) after exhaustion of initial DI entitlement.

The unemployment insurance benefit levels are 70 % of previous gross earnings for a period of 6 months. A benefit extension period can be obtained that depends upon the individuals work history. The benefit extension period ranges from 0 to 60 months. After exhaustion of UI eligibility, benefit levels drop to 70% of the minimum wage. The replacement rate is derived as the ratio of the total amount of DI benefits that an individual would obtain if he/she would remain in DI up to age 65 (mandatory retirement age) and the wage earnings from age at 1991 up to age 65. More specifically,

$$\text{UI rate} = \frac{0.7 * w_t * \text{UI entitl. period} + 0.7*\text{minwage}*(65 - \text{age}_t - \text{UI entitl. period})}{\text{Sum of } w_t \text{ to time at which the individual becomes 65}}$$

Appendix III

Supporting material

Table A1. **Sample descriptives**

Variables	Mean
Female (1/0)	0.1
Bad health (1/0)	0.8
Age in years	54
Married	0.86
Education (1-7)	3.62
White collar (1/0)	0.59
House owner	0.63
Partner works	0.29
ER replacement rate	0.83
Net yearly wage in 1991 ('000)	43.24
Fraction of censored cases	0.68
Elapsed time 1991 job up to 1991 (months)	228
Time from 1991 onwards (35)	35
Number of observations	2560

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